Chapter 2
Proposed Action and Alternatives

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Proposed Action

Location

Bonneville proposes to construct a 500-kilovolt (kV) transmission power line from its McNary Substation to its John Day Substation, a distance of about 79 miles. The new line would begin at the existing McNary Substation in Umatilla City (Umatilla County, Oregon) near the Columbia River and cross the Columbia River into Washington between the McNary Dam and the Umatilla Bridge. The proposed line would then generally follow the Columbia River and State Route (SR) 14 west through Benton and Klickitat Counties. At the John Day Dam, the proposed line would cross back into Oregon and connect into the John Day Substation near Rufus (Sherman County, Oregon) (see Figure 2-1).

Existing Corridor

The proposed line would parallel existing transmission lines in an existing corridor that runs between the McNary and John Day Substations.

There are three existing transmission lines at the river crossing near McNary Substation that cross the river. The transmission line towers closest to the Umatilla Bridge are owned by Benton County Public Utility District (PUD). Benton County PUD is presently not using the towers but is retaining them for future use when they need to run a transmission line from Oregon to Washington. Bonneville proposes to buy these tower locations and replace them with new towers that can hold two lines (double-circuit towers).

As part of the tower location purchase, Bonneville would agree to provide Benton County PUD electrical service on the Washington side of the river as needed. The environmental review for that service would be done at the time the service is requested. The service may include utilizing the vacant side of the new towers (stringing a new line), or building a new switching station near the existing lines on the Washington side.

For most of the route in Washington, Bonneville already has existing right-of-way or easement available next to the lines. When Bonneville built the existing lines, extra right-of-way was acquired to accommodate potential future lines. In most areas, the existing right-of-way corridor is 500 feet wide, which is wide enough to accommodate the proposed line.

A right-of-way is an easement over land owned by someone else. Bonneville rarely owns the land under transmission lines.

The proposed line would be located on the north side of the existing corridor for most of the length. Just after corridor mile 23 the proposed line would have to cross under the existing 500-kV Ashe-Slatt transmission line. In order to have the proposed line cross under it, the Ashe-Slatt line would need a new tower just north of the crossing to lift the conductors up by about 10 feet for adequate clearance.

Mercer Ranch, just north of corridor mile 27 is a location being proposed for a new generation facility. If this facility is approved and built, a new substation would have to be constructed adjacent to the existing transmission line corridor. The proposed McNary-John Day transmission line would be built through this substation. (See the section on Other Projects or Documents Related to this Project, Chapter 1, for more information about the Mercer Ranch Project.) At around corridor mile 68, the new line would cross to the south side of the existing corridor and continue to the river crossing at John Day Dam.

The corridor mile numbers start at the McNary Substation (corridor mile 1) and proceed along the existing lines to the John Day Substation (corridor mile 79). Bonneville numbers the towers by the corridor mile and number of towers in that corridor mile (e.g., 8/3 means the third tower in corridor mile 8).

The new transmission line would cross the Columbia River into Oregon just south of the John Day Dam. One transmission line presently crosses the river at this point. The new line would be adjacent and just east of the existing line crossing. The new line would cross the river and proceed south, straight up into the hills above the railroad and Interstate 84 (I-84). The line would turn west and join a large corridor of seven other transmission lines and continue for about 3 miles into the John Day Substation. This new line would be located between existing lines on the north side of the corridor.

Along the majority of the existing corridor between the McNary Substation and the crossing at John Day Dam, there are two existing transmission lines; in some areas there are three existing lines. In those portions of the corridor where there are two existing lines, these include

- a 230-kV line with lattice steel towers about 80 feet tall, and
- a 345-kV line with lattice steel towers about 110 feet tall.

There are two sections of the corridor where a third transmission line has joined the corridor. These sections are

- corridor mile 23, the Ashe-Slatt/Marion double circuit 500-kV line (about 180 feet tall) that parallels the existing lines for about 4 miles; and
- corridor mile 68, the Hanford-John Day 500-kV line (about 145 feet tall) that parallels the existing lines for about 6 miles, until the river crossing.

Line Separation

If a proposed line (usually a 500-kV line, but in some cases a lower voltage line) is a key component to the main grid and is constructed next to an existing line that is also very important to the main grid, transmission line planners have to determine the likelihood and consequences of an outage that could affected both lines. The outage of multiple important lines in an area greatly increases the chances for blackouts. The events that could cause simultaneous outage of lines include one tower falling into an adjacent line, aircraft flying into the lines, fire on the right-of-way causing smoke to envelop more than one line, and lightning strikes. These risks are lessened by separating the high-risk lines by 200 feet or more, preferably at least 1,000 to 1,500 feet (a span length).

For this project the proposed line would parallel existing 500-kV lines in a couple of locations and lower voltage lines for the entire length. Planners determined that the distance of the parallel to the 500-kV lines would be short and the risks for simultaneous outage low. The lower voltage lines are not considered important lines to the main grid. Therefore, the proposed line would be separated from the existing lines by the typical distance that insures that the conductors of the two lines would not swing into one another and that one tower could not fall into the adjacent line (about 150 feet).

New Easements

Some new right-of-way easements would need to be purchased adjacent to the existing corridor along approximately 14 miles of the route. The easements would give Bonneville the rights to construct, operate, and maintain the line in perpetuity. The new right-of-way easements would be needed in the following locations:

- from corridor mile 23 through 27, a 70-foot-wide right-of-way easement on the north side of the existing right-of-way;
- from corridor mile 43 through 47, a 140-foot-wide right-of-way easement on the north side of the existing right-of-way; and
- from corridor mile 69 through 75, a 200-foot-wide right-of-way easement, some of which would be on the north side and some on the south side of the existing right-of-way. See the discussion of the Hanford-John Day Junction Alternatives later in this chapter for more details.

Towers

The towers for the proposed new 500-kV line would be 145 to 165 feet tall lattice steel towers with spans of 1,150 to 1,500 feet between towers. The towers would be similar to the towers of the existing lines (see Figure 2-2). The towers would be made of galvanized steel and may appear shiny for two to four years before they dull with the weather. About 360 transmission towers would be needed to carry the wires (conductors) for the proposed transmission line, including about 20 towers in Oregon and 340 towers in Washington.

Bonneville would use two types of tower structures: tangent structures and dead-end structures. Tangent structures would be used on relatively straight stretches of line. Dead-end structures would be used where the line makes a sharp turn or when the conductor tension changes. Dead-end structures are much stronger (about double the thickness) than tangent structures, in order to hold the tension of the conductors.

Exact tower heights and spans along any line may change depending on the terrain, need for highway crossings, or other factors.

Tower Footings

Transmission towers are attached to the ground with footings. The footings are a metal assembly in the ground at each of the four tower corners. Three types of footings would be used depending on the terrain and tower type.

- Plate footings are the most commonly used footing types. They consist of a 4-foot by 4-foot steel plate buried about 11 feet deep.

- Grillage footings are used to support heavier structures, such as dead-end towers. They are 12.5-foot by 12.5-foot, wielded steel I-beams buried about 15 feet deep.
- Rock anchor footings are used when a tower is built on solid bedrock. Holes are drilled into the bedrock and the steel anchor rods are secured within the hole with concrete. Then the tower footings are attached to the rods.

A trackhoe would be used to excavate an area for the footings. The excavated area would be at least 2 feet larger than the footings to be installed (if the soil is loose or sandy, then a wider hole may be necessary). Each tower would use an area of about .05 acre, with a temporary disturbance during construction of about 0.25 acre (equipment, soils, etc.). All of the soil and rock removed would be used to backfill the excavated area once the footings are installed.

Conductors

The wires that make up transmission lines are called conductors. The conductors carry the electrical current. There are three bundles of conductors making up a transmission line; each bundle consists of three conductor wires of 1.3 inches diameter. From a distance, a bundle looks like a single wire. The conductors for the proposed transmission line would be treated to reduce the shininess of the metal.

The three conductor bundles are attached to the towers using insulators (see Figure 2-3). Insulators are bell-shaped devices that prevent the electricity from jumping from the conductors to the tower and going to the ground. The insulators are made of porcelain or fiberglass and are nonreflective. In the past when glass insulators were used, the reflection of the sunlight made them visible from great distances.

For safety reasons, the National Electrical Safety Code establishes minimum conductor heights. For 500-kV lines (as is the proposed line), the conductor must be at least 35 feet from the ground. Clearances would be greater over highways, railroads, and river crossings.

Bus work is used when a conductor cannot be strung between towers. The electricity runs on a pipe set about 15 feet off the ground. For safety reasons, the area surrounding the two towers on either end of the bus work and the pipe is fenced and graveled (similar to a small substation). Like a substation, the area must be kept free of vegetation.

Two smaller wires (0.5-inch diameter), called overhead ground wires, would also be attached to the top of the transmission towers. Ground wires are used for lightning protection. The ground wires are strung from the top of one structure to the next. When lightning strikes, the ground wire takes the charge instead of the conductors. A series of wires, called counterpoise, is buried in the ground at each structure. These wires are used to establish a low resistance path to earth for lightning.

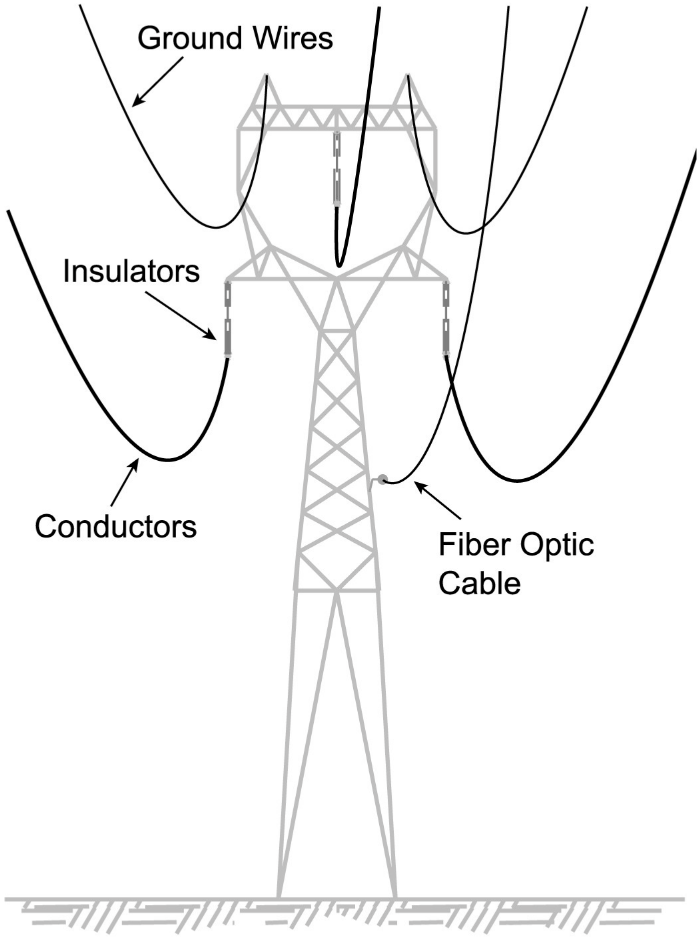

Figure 2-3. Conductors, Ground Wires, and Fiber Optic Cable

A fiberoptic cable would also be strung on the towers below the conductors (see Figure 2-3). The fiberoptic cable would have up to 72 fibers. The fiber would be used for communications as part of the power system. Fiberoptics technology uses light pulses instead of radio or electrical signals to transmit messages. This communication system can gather information about the system (such as the transmission lines in service and the amount of power being carried, meter reading at interchange points, status of equipment and alarms). The fiberoptic cable allows voice communications between power dispatchers and line maintenance crews and provides instantaneous commands that control the power system operations.

Tree Clearing

Most of the vegetation along the corridor is low-growing sagebrush or fields that are compatible with transmission lines. Tall trees cannot be allowed to grow under or near the lines because electricity can arc, which can start a fire or injure or kill someone nearby. The existing corridor does cross some windbreak trees, orchards, and tree farms that grow deciduous trees for paper products. About 25 acres of trees would need to be removed; a total of 50 acres would be permanently removed from cottonwood production. Some trees may also need to be removed between the McNary Substation and the river crossing.

Access Roads

Access roads are the system of roads that Bonneville's construction and maintenance crews would use to get to the towers or tower sites along the line. The roads are designed to be used by cranes, excavators, supply trucks, boom trucks, log trucks, and line trucks. Bonneville prefers road grades to be 15% or less depending on the erosion potential of the soil. Roads are graded to provide a 16-foot-wide travel surface (somewhat wider on curves), with about a 20-foot-wide total area disturbed (including drainage ditches).

Bonneville's road systems consist of a mix of permits or access road easements across public and private ownership. For this project, much of the transmission line corridor lies within 2 miles of public highways. Because the proposed transmission line would be next to existing lines, the proposed new line would utilize up to 90% of the existing 90 miles of access roads. Many of the access roads are approached from SR 14; there are 35 sites where Bonneville vehicles leave the highway directly onto an access road.

The new transmission line would require some upgrades of existing access roads, construction of new access roads and road spurs, and purchase of new easement.

- **Road upgrades.** Approximately 40 miles of existing access road would need to be reconditioned and widened. Roads would be graded, and rock would be used where the soil is unstable.
- **Spur roads.** About 270 short spur roads, each about 250 feet long, would be needed from an existing access road to a new tower. These spur roads would be within the existing right-of-way.
- **New roads.** About three miles of new road would need to be built from corridor mile 39 to 41 (4 miles east of Roosevelt). The terrain in this area is very steep. Because the new transmission line would be at a higher elevation than the existing lines, the grades of spur roads from the existing access road would be too steep. Instead, a parallel access road would be built at the elevation of the new towers in this section of line.
- **Easement purchases.** Bonneville proposes to purchase easements (rights for access) for up to 30 new access roads in areas off of the right-of-way. A majority of these easements would be for existing private roads (such as driveways or farm roads). In a few areas, Bonneville would need to buy an easement to build a new road.
- **New gates.** About 38 new swing gates would be installed with about 23 of these new gates replacing barbed-wire or broken gates. Bonneville, in coordination with landowners, gates the entrances to access roads to prevent public access to private lands and the transmission line right-of-way. There are also gates in fences that separate animals or denote property lines. Gate locks are coordinated with the landowners to ensure that both Bonneville and the landowner can unlock the gates.

Most access roads would be on the native surface (dirt roads or sparse vegetation). Many of the existing access roads and farm roads are made of compacted soils; in other areas they are naturally rocky. Some rock would need to be added in a few sandy locations. There would be no new road crossings of year-round streams, so no new culverts would be needed. Drain dips or water bars may be needed on a few access roads that cross drainages that carry seasonal runoff.

Staging Areas

Temporary staging areas would be needed along or near the proposed transmission line for construction crews to store materials and trucks. The contractors hired to construct the transmission line would be responsible for determining appropriate staging area locations. Often the contractors rent empty parking lots or already developed sites for use as staging areas. The contractors would also be responsible for working with state and local governments to obtain any required permits or environmental reviews for the staging areas.

Substation Work

The proposed line would come out of the McNary Substation and would enter into the John Day Substation. New equipment would be needed at each substation. At the McNary Substation (in Umatilla City, Oregon) the east side of the substation would require an expansion measuring 80 feet by 700 feet, about 1.3 acres (see Figure 2-4). The substation expansion would be on Bonneville property and would require some excavation and fill, although the ground is relatively flat in that area. This expansion would hold three new 500-kV bays in which the lines terminate. This equipment and expansion at the McNary Substation would be used for several projects besides the new McNary-John Day transmission line. Since the work on the other projects would occur at the same time, the entire expansion is explained here.

At the John Day Substation near Rufus, the line would terminate into a new 500-kV bay located within the existing substation fence. No expansion would be necessary.

The 500-kV-bay equipment to be installed in the substations includes the following.

- **Power circuit breakers.** A breaker is a switching device that can automatically interrupt power flow on a transmission line at the time of a fault, such as a lightning strike, tree limb falling on the line, or other unusual events. The breakers would be installed at the substation to redirect power as needed. Several types of breakers have been used in Bonneville substations over the years. The breakers planned for this project, called gas breakers, are insulated by special nonconducting gas (sulfur hexafluoride). These breakers would contain no oil, except a small amount of hydraulic fluid.

- **Switches.** These devices are used to mechanically disconnect or isolate equipment. Switches are normally located on both sides of circuit breakers.
- **Substation dead-end towers.** These are the towers within the substation where incoming or outgoing transmission lines end. Substation dead-ends are typically the tallest structure within the substation.
- **Substation fence.** A chain-link fence with barbed wire on top surrounds the substation for security and public safety.
- **Substation rock surfacing.** A 3-inch layer of rock, selected for its insulating properties, is placed on the ground within the substation to protect operation and maintenance personnel from danger during substation electrical failures.

Line Planning and Construction

To determine exact tower location along a transmission line right-of-way, Bonneville first lays large Xs (photograph panels with exact coordinates) on the ground and takes photographs of the route from an airplane. These photographs help crews survey the route previously laid out by engineers. The surveys are used for determining the profile of the ground. With the profile, engineers can determine where towers and access roads should be located, how tall towers should be, and how much right-of-way is needed. Engineers also use the environmental information and discussions with landowners to help determine tower and access road locations.

Next, the right-of-way is cleared of any vegetation that may hinder line safety or construction access (see the previous discussion of tree clearing for details). Access roads are built or upgraded.

Holes for tower footings are dug with a trackhoe and footings put in place at each tower site. Towers are either assembled at the tower site and lifted into place by a large crane (30- to 100-ton-capacity) or assembled at a staging area and set in place by a large sky-crane helicopter. The towers are then bolted to the footings.

The conductor is strung from tower to tower through pulleys on the towers. A "sock line" is placed in the pulleys and pulled through by a helicopter much smaller than the sky-crane. The conductor is attached to the end of the sock line. Every 2 to 3 miles there is a conductor-tensioning site where trucks pull the conductor to the correct tension. The temporary conductor tensioning sites typically disturb an area of about 1 acre. The appropriate areas for conductor tensioning sites are determined by the construction contractor using environmental and land use information provided by Bonneville.

The conductor has to be fitted together when one reel of conductor ends and a new one begins. There are two types of conductor fittings: hydraulic compression and implosive devices. Hydraulic compression uses a press that compresses the fittings on the conductor. With implosive fittings, an explosive device is set off with a sound like a gunshot, causing the fitting to tighten around the conductor to provide a solid connection. Nine conductors (three bundles each with three conductors) would need to be fitted about once every 2 to 3 miles.

Construction Schedule and Work Crews

The proposed timeframe for construction would be a 1-year period from January 2003 to December 2003.

The line would be constructed by one or more construction crews. A typical transmission line construction crew for a 500-kV line consists of

- 50 to 60 construction workers,
- 20 vehicles (pickups, vans),
- 3 Manitex bucket trucks,
- 1 conductor reel machine,
- 3 large excavators,
- 1 line tensioner, and
- 1 helicopter.

A typical crew can usually construct about 10 miles of transmission line in 3 months. To meet the proposed construction schedule for this project, most likely up to three crews would work simultaneously on separate sections of line.

Maintenance

During the life of the project, Bonneville would perform routine, periodic maintenance and emergency repairs to the transmission line. For lattice steel structures, maintenance usually involves replacing insulators. Every 2 months, a helicopter would fly over the line to look for hot spots (areas where electricity may not be flowing correctly) or other problems indicating that a repair may be needed.

Vegetation is also maintained along the line for safe operation and to allow access to the line. The area along the McNary-John Day transmission line needs little vegetation maintenance because it has sagebrush and other low-growing vegetation. In orchards and vineyards, landowners are responsible for keeping the trees trimmed and the appropriate distance away from the conductors.

Bonneville's vegetation management would be guided by its Transmission System Vegetation Management Program EIS (see the section on Other Projects or Documents Related to this Project, Chapter 1 for more information). Bonneville uses an integrated vegetation management strategy for controlling vegetation along transmission line rights-of-way. This strategy involves choosing the appropriate method for controlling the vegetation based on the type of vegetation and its density, the natural resources present at a particular site, landowner requests, regulations, and costs. Bonneville may use a number of different methods: manual (hand-pulling, clippers, chainsaws), mechanical (roller-choppers, brush-hogs), biological (insects or fungus for attacking noxious weeds), and herbicides.

Prior to controlling vegetation, Bonneville sends notices to landowners and requests information that might help in determining appropriate methods and mitigation measures (such as herbicide-free buffer zones around springs or wells). Noxious weed control is also part of Bonneville's vegetation maintenance program. Bonneville works with the county weed boards and landowners on area-wide plans for noxious weed control.

Estimated Project Cost

The estimated cost for constructing the entire protect is $100 million.

Short-Line Routing Alternatives

This EIS addresses short-line routing alternatives at four locations along the project corridor, as described below. These four areas include:

- McNary Substation,
- Hanford-John Day Junction,
- Corridor Mile 32, and
- Corridor Mile 35.

McNary Substation Alternatives

The alternatives listed below are located between the McNary Substation and the Columbia River crossing. The proposed transmission line would exit the northeast side of the substation (facing the river) and head to the river crossing. This area is congested with transmission lines coming into the substation and abuts the Corps Wildlife Natural Area that runs along the river. (See Figure 2-4.)

Alternative A – Relocate Building

With this alternative, the transmission line would exit the northeast side of the substation, cross Third Street (which runs in front of the substation), and head west, adjacent to the road for about 2,400 feet, then turn north and cross the Corps Wildlife Natural Area to the river crossing. The new line would cross six transmission lines coming from McNary

Dam. Where the line runs along the road, there is a 2,000-square-foot Bonneville office building. The building would need to be relocated because the new 500-kV line would cross directly over the top of it, causing potential safety hazards. The building would be relocated somewhere adjacent to the substation within the Bonneville property line.

Alternative B – Cross Wildlife Area

With this alternative, the new transmission line would exit the northeast side of the substation, cross Third Street, and run northwest (gradually toward the river) behind the office building and across the Corps Wildlife Natural Area. This alternative may require removal of some cottonwood trees. The new line would also cross six lines coming from McNary Dam.

Alternative C – Bus Work in Wildlife Area

For this alternative, the transmission line would exit the northeast side of the substation, cross Third Street, then descend into bus work across the Corps Wildlife Natural Area behind the office building. The bus work would be about 2,000 feet long by 75 feet wide.

Hanford-John Day Junction Alternatives

At about corridor mile 68, the 500-kV Hanford-John Day transmission line joins the existing right-of-way from the north. It parallels the existing lines on the north side for the rest of the route. At corridor mile 70, the proposed line would be on the south side of the right-of-way through the remainder of the route. There is a 2-mile stretch where there are three alternatives for where to place the proposed line. (See Figures 2-5, 2-6, and 2-7.)

Alternative A – North Side

With this alternative, the proposed transmission line would stay in the same alignment paralleling the existing lines (see Figure 2-5). This would require moving the existing Hanford-John Day line 200 feet to the north. At corridor mile 70, the proposed line would cross to the south side of the corridor and the Hanford-John Day line would ease back into its alignment in the corridor.

Alternative B – South Side

With this alternative, the proposed transmission line would cross to the south side of the corridor just before the Hanford-John Day line enters the right-of-way. See Figure 2-6. The proposed line would stay on the south side through the rest of the route. For the first mile on the south side, the line would also be on the south side of the highway. Just before corridor mile 70, there is a house with a barn and a shed on the south side of the highway. This alternative would require the removal of the barn and shed, and may require the removal of the house.

Alternative C – South Side, Highway

This alternative is very similar to Alternative B; the proposed line would cross to the south side of the corridor and highway just before the Hanford-John Day line enters the right-of-way. This alternative differs from Alternative B in that the proposed line would stay on the south side of the highway until the existing lines cross the highway. This alternative would eliminate two highway crossings of the proposed line (see Figure 2-7). As with Alternative B, the barn and shed (and possibly the house) would need to be removed. With this Alternative C, the line would be about 35 feet closer to the house than with Alternative B.

Corridor Miles 32 and 35 Alternatives

The existing right-of-way crosses two lots that are owned by members of the Yakama Nation. The existing easements on these lands are due to expire in 2003. The remainder of the right-of-way easements are perpetual. On tribal lands, the initial easements were for 50 years. Because Bonneville does not know how the negotiations for extending the easements will go, it is considering two alternatives at each site: paralleling the existing lines across the tribal property or moving the entire corridor, its two existing lines, and the new proposed line off of tribal property. (See Figure 2-8.)

Corridor Mile 32 Alternatives

Alternative A – Parallel existing line across tribal allotment.

With this alternative, Bonneville would construct the proposed line across the tribal-owned property at corridor mile 32, paralleling the existing lines within the existing right-of-way. About 1,100 feet of conductor and perhaps one tower would be located on the property.

Alternative B – Move entire corridor off of tribal property.

With this alternative, the proposed line would be moved to skirt around the tribal-owned property. The other two existing lines would also be moved to avoid the property. This alternative would require one additional tower for the proposed line. For the existing lines, eight towers (four for each line) would be removed and ten new towers (five for each line) constructed for the reroute. New right-of-way would be purchased from the landowners.

Corridor Mile 35 Alternatives

Alternative A – Parallel existing line across tribal allotment.

With this alternative, Bonneville would construct the proposed line across the tribal-owned property at corridor mile 35, paralleling the existing lines within the existing right-of-way. About 500 feet of conductor would be located across the property.

Alternative B – Move entire corridor off of tribal property.

With this alternative, the proposed line would be moved to skirt around the tribal-owned property at corridor mile 35. The other two existing lines would also be moved to avoid the property. No additional towers would be required for this alternative (compared to Alternative A). For the existing lines, eight towers (four for each line) would be removed and eight new towers (four for each line) constructed for the reroute. New right-of-way would be purchased from the landowners.

No Action Alternative

The No Action Alternative would be to not build the proposed transmission line. If Bonneville did not build this line, new generation facilities in the area could not connect and send power over the transmission system.

Comparison of the Alternatives and Summary of Impacts

Table 2-1 compares the Proposed Action and the No Action Alternatives based on the purposes of the project described in Chapter 1.

Table 2-1: Comparison of the Proposed Action and No Action Alternatives

Purpose	Proposed Action	No Action
Maintain transmission system reliability	Constructing the proposed 500-kV transmission line would help ensure that present and forecasted power demands in the Pacific Northwest could be met without the risk of power interruptions due to demand becoming greater than the reliable capacity in the system. The proposed transmission line would also increase the reliability of the electrical grid in the region by providing an additional service line for power should there be an interruption in the operation of one of the other transmission lines in the area. The proposed line would also help Bonneville meet its statutory obligations to construct additions to the transmission system to integrate and transmit electric power from new generation sources, and to maintain the stability and reliability of the system 16 U.S.C., 838 (a), (b), and (c).	By not constructing the proposed transmission line, there would be increased risk of power interruptions occurring in the Pacific Northwest Service Area due to insufficient capacity in the grid as demand increases. Also, the ability for Bonneville to provide continuous electric service would be reduced should there be a failure in any of the other main transmission lines serving the region. Furthermore, by not constructing the line, Bonneville would not be meeting its statutory obligations as a federal agency.

Purpose	Proposed Action	No Action
Ensure consistency with environmental and social responsibilities	Although constructing the proposed transmission line would not be free of environmental impacts (see Table 2-2), siting the proposed line within an existing transmission corridor, and employing mitigation measures to protect resources and Best Management Practices during construction and operations would ensure consistency with Bonneville's environmental stewardship mandates. Also, the proposed transmission line would help Bonneville meet social responsibility obligations for providing safe and reliable electric service to the public in the Northwest.	If the line were not built there would not be any environmental impacts due to construction or operation. Some social impacts may occur due to not being able to meet electrical demands (such as possible higher electricity costs, or possible long term cutbacks on electrical consumption).
Provide cost and administrative efficiency	The proposed transmission line project would cost about $100,000 million. For a line of this length, utilizing existing right-of-way with a relatively direct route between the two substations, the proposed line provides cost and administrative efficiency.	No immediate costs would be involved if the line were not built.

Table 2-2 compares the short-line routing alternatives in terms of the purposes outlined in Chapter 1. Table 2-3, at the conclusion of this chapter, summarizes the impacts of the proposed action. Table 2-4 summarizes impacts of the short-line routing alternatives.

Table 2-2: Comparison of Short-Line Routing Alternatives

Alternative	Purposes		
	Maintain Transmission System Reliability	Ensure Consistency with Environmental and Social Responsibilities	Provide Cost and Administrative Efficiency
McNary Substation Alternatives			
A. Relocate administration building presently located on north side of substation adjacent to Wildlife Natural Area	Same as Alternative B; better than Alternative C	Slightly less impact than Alternatives B and C	Same as Alternative B; less than Alternative C
B. Cross Wildlife Natural Area; circumvent administration building on north side	Same as Alternative A; better than Alternative C	More impact than Alternative A; slightly more than Alternative C	Same as Alternative A; less than Alternative C
C. Place line in bus work at ground level on north side of administration building, inside Wildlife Natural Area	Least reliable; crossing under multiple lines, any failure of existing lines would cause outage of proposed line	More impact than Alternative A; slightly less than Alternative B	Most expensive, dead-end structures and bus equipment cost more

Alternative	Purposes		
	Maintain Transmission System Reliability	Ensure Consistency with Environmental and Social Responsibilities	Provide Cost and Administrative Efficiency
Hanford-John Day Junction Alternatives			
A. Move existing Hanford-John Day line north 200 feet to make room for new line on north side of corridor	Slightly less reliable than Alternatives B and C; next to existing 500-kV line, failure would cause larger outage	Less impact than Alternatives B or C	Most expensive; taking out and rebuilding short section of Hanford-John Day line
B. Place new line on south side of corridor	Same as Alternative C; better than Alternative A	More impact than Alternative A; slightly more than Alternative C	Less than Alternative A, more than Alternative C; more dead-end structures for angles
C. Place new line on south side of highway	Same as Alternative B; better than Alternative A	More impact than Alternatives A and C	Least expensive; straight line
Corridor Mile 32 Alternatives			
A. Keep existing and new lines on tribal land	Same as Alternative B	More impact than Alternative B	Less than Alternative B
B. Relocate existing and new lines away from tribal land	Same as Alternative A	Less impact than Alternative A	More than Alternative A
Corridor Mile 35 Alternatives			
A. Keep existing and new lines on tribal land	Same as Alternative B	More impact than Alternative B	Less than Alternative B
B. Relocate existing and new lines away from tribal land	Same as Alternative A	Less impact than Alternative A	More than Alternative A

Alternatives Considered but Eliminated from Detailed Study

During the scoping process, Bonneville consider a range of alternatives for the proposed action. Bonneville assessed whether the alternatives were reasonable and merited detailed study in this EIS. Alternatives that did not meet the need and purposes (see Chapter 1), including whether they were practical or feasible, or would obviously have greater adverse environmental impacts than the proposed action, were eliminated from detailed study. This section summarizes those alternatives considered but eliminated from detailed study in this EIS.

Oregon Route Alternative

Bonneville examined various ways to transmit power from east to west, including a new transmission line from the McNary Substation to the John Day Substation through Oregon. This Oregon routing alternative would have required the purchase of all new right-of-way for there is no existing vacant right-of-way available for a 500-kV line in this area of Oregon. The location of a line in Oregon could be adjacent to existing lines in some areas, but would mostly require the development of a new corridor where there are no existing transmission lines. In the areas where existing lines could be paralleled, there are many homes. The cost of constructing a new 500-kV line in Oregon would be considerably greater than the proposed route in Washington due to purchasing all new right-of-way, constructing a new access road system, and the mitigation measures that would be needed (particularly in areas with residences where new right-of-way would be purchased). The social and environmental impacts of an Oregon route would also be much greater with the relocation of residents, disruption of existing land uses, construction of new access roads (erosion, water quality), and potential vegetation clearing.

Because the proposed route and the short-line routing alternatives discussed in this EIS are mostly within existing right-of-way (purchased years ago with the construction of the existing lines), the land uses in the right-of-way are compatible with transmission line operation.

McNary Substation Southeast Alternative

In examining ways for the line to exit the McNary Substation and reach the river crossing, Bonneville considered exiting the southeast side of the substation. The line would run west along the back side of the substation, and turn north along the west side of the substation to the river crossing.

This alternative was eliminated from consideration for reliability reasons. The line would have to cross a number of transmission lines presently exiting the substation. These lines serve electric loads west and south of the McNary Substation. In the rare event that the proposed line fell, those existing lines would be put out of service, affecting a large number of customers.

Increased Capacity Line Alternative

During scoping, Bonneville was asked to consider all the generation projects being proposed in the area and construct the transmission line with a capacity to carry all the power that could be generated. The proposed line would have a capacity of 1,400 to 2,300 MW. The commentors requested that it be capable of carrying 5,000 MW or more. When transmission system planners consider integrating new generation they analyze the whole transmission system to determine what is needed to transmit a certain amount of energy. When considering the construction of new transmission lines, the planners have to consider the back-up line(s) if any component of the transmission system were to fail. There is sufficient back-up in the area for the proposed line. If the proposed line were to fail, then all the energy would flow over remaining lines (such as the existing McNary-Slatt 500-kV line and the McNary-Ross 345-kV line and several smaller capacity lines). If the proposed line were built to carry more energy and the line failed, the back-up lines would become overloaded and shut down. In order to maintain the reliability of a new line carrying 5,000 MW, a new second high voltage line would have to be built as a back-up. Rather than building two high voltage lines now, Bonneville's system planners will continue to evaluate the need for increased capacity as new generation facilities request interconnection.

Underground Transmission Line Alternative

During scooping a person suggested putting the transmission line underground. Bonneville considers, and at times has used, underground transmission cables for new lines. The cables used for undergrounding are highly complex in comparison to overhead lines. Even with current technologies, transmission cables exceed the cost of overhead lines by many times. For 500-kV lines, underground cable may be ten times as costly as overhead designs. Because of the cost, Bonneville uses underground cable in limited, special reliability, or routing situations, such as near nuclear power stations, at locations where high capacity lines must cross, at long bay crossings, or in urban areas. Transmission cables used by Bonneville are only at lower voltages and are short in comparison to typical overhead transmission lines. Bonneville's longest underground cable is a 8-mile-long 115-kV cable. Bonneville has no 500-kV underground cable in our system. The Bureau of Reclamation operates two 6,000-foot-long, 500-kV underground cables at Grand Coulee Dam. Underground cables are also much more difficult to maintain than overhead lines and take longer to repair.

Bonneville has kept abreast of transmission cable technologies. Cable technology has not advanced as quickly as the industry anticipated, nor have costs declined as expected. Cable remains a tool available for special situations, but because of its high cost it would not meet the purposes and need of this project.

Double Circuit Alternative

During scoping, it was requested that Bonneville take out one of the existing lines and put in a double circuit line (one set of towers to hold both the existing line and the proposed line). This alternative was eliminated due to costs. The transmission towers for a double circuit line are twice as much as for single circuit (the tower has to be twice as thick to carry the tension of two lines). The tower costs far outweigh any savings due to access road construction or right-of-way purchases. The overall cost of removing one of the existing lines and constructing a double circuit line would be much greater than constructing the proposed single circuit line. There would be less environmental impacts from the proposed line for some of the new access roads and spur roads would not be needed; however, all the access road upgrades would still be repaired. Visual impacts and land use would be less with less towers and no new right-of-way. Tower footing impacts (land use disturbance, vegetation removal, erosion potential) would be about the same as constructing the proposed line since the new towers would not be placed in the same locations as the ones removed. When towers are removed, in most cases the footings are cut off at ground level, leaving the underground portion in place. The new towers could not use the existing footings or be placed where old underground footing portions are located.

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 1

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Land Use and Recreation		
▪ Temporary disturbance to upland bird hunting in project vicinity ▪ Approximately 47 acres impacted by new roads, 93 acres impacted by tower construction, and 25 acres of poplar trees cut and converted to agriculture compatible with the transmission line	▪ Locate towers and roads so as not to disrupt irrigation circles, where possible ▪ Locate structures and roads outside of agricultural fields, orchards, and vineyards, where possible ▪ Coordinate with landowners for farm operations, including plowing, crop dusting, and harvesting ▪ Redesign irrigation equipment and compensate landowner for additional reasonable costs where new right-of-way needs to be acquired ▪ Compensate farmers for crop damage and restore compacted soils ▪ Control weeds around the base of the towers ▪ Keep gates and fences closed and in good repair to contain livestock	▪ No impact
Geology, Soils, and Seismicity		
▪ Removal of vegetation and disturbance to underlying soils in an area of up to 222 acres ▪ Operation and maintenance activities could increase erosion potential along the project corridor	▪ Minimize vegetation removal ▪ Avoid construction on steep slopes where possible ▪ Properly engineer cut-and-fill slopes ▪ Install appropriate roadway drainage to control and disperse runoff ▪ Ensure graveled surfaces on access roads in areas of sustained wind ▪ Develop additional mitigation measures (using a certified engineer) between corridor miles 39 and 41 due to the presence of an active landslide in the vicinity of tower 40/3 ▪ Apply erosion control measures such as silt fence, straw mulch, straw wattles, straw bale check dams, other soil stabilizers, and reseeding disturbed areas as required ▪ Regularly inspect and maintain project facilities, including the access roads, to ensure erosion levels remain the same or less than current conditions	▪ No impact

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 2

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Streams, Rivers, and Fish		
▪ Potential transport of sediment to fish-bearing waters ▪ Potential accidental spills of construction materials into waterways ▪ Potential dry wash crossing and culvert installation ▪ Potential blasting near fish-bearing waters ▪ Implementation of vegetation management techniques	▪ Use erosion control methods during construction (see mitigation measures for Geology, Soils, and Seismicity) ▪ Develop and implement a Spill Prevention and Contingency Plan ▪ Install water and sediment control at dry wash crossings and construct culverts per WDFW guidelines ▪ Avoid blasting within 200 feet of streams when salmon eggs or alevins are in gravels ▪ Follow BMPs defined in Vegetation Management Plan	▪ No impact
Vegetation		
▪ Proposed project would temporarily disturb 121 to 134 acres depending on the number and location of conductor tensioning sites ▪ Temporary impact to 24 to 27 acres of native plants and 4 acres of cryptogramic crusts; permanent impact to 12 acres of native plants and 2 acres of cryptogramic crusts ▪ Establishment of noxious weeds ▪ Vegetation loss due to fire	▪ Locate transmission line as close as possible to existing lines to minimize additional clearing ▪ Utilize existing access roads to reduce need for new access roads; limit construction equipment to designated construction areas ▪ Avoid placing towers in riparian zones ▪ Keep vegetation clearing to a minimum ▪ Reseed areas temporarily disturbed in higher quality shrub-steppe with native grasses and forbs ▪ Minimize disturbance to native species during construction to prevent invasion by nonnative species ▪ Conduct pre- and post-construction noxious weed surveys; enter into active noxious weed control programs ▪ Wash vehicles that have been in weed-infested areas ▪ Use certified weed-free mulch ▪ Equip all project vehicles with basic fire-fighting equipment, including extinguishers, shovels, and other equipment deemed appropriate	▪ No impact

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 3

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Wildlife		
▪ Construction noise and activities would cause some wildlife to avoid areas of active construction ▪ Temporary impact to 24 to 27 acres of shrub-steppe habitat and permanent impact to 12 acres of shrub-steppe ▪ Potential for bird collisions with new transmission line, particularly where line would cross open water or wetlands	▪ Prior to construction, conduct raptor nest surveys of cliffs located within 0.25 mile of the right-of-way and in potential burrowing owl nesting habitat within the right-of-way ▪ If nests are found, follow the species-specific mitigation measures defined in the Wildlife section of Chapter 3 of this EIS ▪ Minimize the impact of shrub-steppe plant communities by clearing the least amount of vegetation necessary ▪ Minimize road construction in shrub-steppe areas with burrows (corridor miles 19, 21, 63, and 76) ▪ If deemed appropriate, install line markers in avian flight paths or migration corridors such as near crop irrigation circles and the Columbia River crossing ▪ For the McNary Substation Alternative, avoid placing towers and lines across wetlands to minimize risk of collisions	▪ No impact
Water Resources and Wetlands		
▪ Potential removal of wetland buffer vegetation at corridor mile 48, 50, and between corridor mile 71 and 74, with risk of increasing silt and sediment to wetlands ▪ Accidental spills of hazardous or toxic materials used or stored on the project site (fuels, lubricants, solvents)	▪ Locate structures, roads, and staging areas to avoid waters of the United States ▪ Avoid construction within designated Klickitat and Benton County, Washington wetland and stream buffers to protect potential groundwater recharge areas ▪ Use erosion control measures (see mitigations listed in the Soils, Geology, and Seismicity section) when conducting any earth disturbance within 100 feet of wetlands, or within the resource buffer as established by Benton and Klickitat Counties ▪ Place tower footings on upland basalt outcroppings and limit access road construction in wetlands complex and buffers between corridor miles 70 and 74, if possible ▪ Place tower footings and access roads within uplands within the wetland complex between corridor miles 48 and 50	▪ No impact

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 4

<table>
<tr><th colspan="2">Proposed Action</th><th>No Action</th></tr>
<tr><th>Potential Impact</th><th>Mitigation Measures</th><th>Potential Impacts</th></tr>
<tr><td colspan="3">Water Resources and Wetlands</td></tr>
<tr><td></td><td>▪ Avoiding refueling and/or mixing hazardous materials where accidental spills could enter surface or groundwater
▪ Avoid mechanized land clearing within wetlands and riparian areas to avoid soil compaction from heavy machinery, destruction of live plants, and potential alteration of surface water patterns to reduce groundwater turbidity risk
▪ Anticipate and avoid, as required, contaminated soil and underground tanks during construction activities near pipelines and agricultural and other historic projects; anticipate and avoid orphaned wells, as required, particularly near the Washington communities of Plymouth, Paterson, Roosevelt, Sundale, and Towal
▪ Avoiding refueling and/or mixing hazardous materials where accidental spills could enter surface or groundwater
▪ Implement the Spill Prevention and Contingency Plan</td><td></td></tr>
<tr><td colspan="3">Cultural Resources</td></tr>
<tr><td>▪ Disturbance of undiscovered hunter-fisher-gatherer resources or unrecorded cultural resources</td><td>▪ If archaeological or historic materials are discovered during construction, surface-disturbing activities at the site would cease, and Bonneville, State Historic Preservation Office, and tribal personnel would be notified to ensure proper handling of the discovery
▪ Locate structures, new roads, and staging areas so as to avoid known cultural resource sites and limit contractor access to cultural resource site sensitive information on a need-to-know basis
▪ The Umatilla Tribes CRPP identified ten TCP areas and recommends the presence of a tribal monitor during all ground disturbing activities; tribal consultation throughout the construction process (from the planning phase through the completion of the project); and collaboration between Jones & Stokes, Bonneville, and the CRC and the Board of Trustees to set up required consultation protocols on site mitigation and management
▪ The Umatilla Tribes would like Bonneville to ensure that the cultural and natural resources are protected as well as guaranteed traditional use of this area, in accordance with treaty reserved rights</td><td>▪ No impact</td></tr>
</table>

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 5

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Visual Resources		
▪ Temporary alterations to viewscape from construction activities ▪ Change in viewscape; impacts would be greatest for residential viewers	▪ Site all construction staging and storage areas away from locations that will be clearly visible from SR 14 to the extent practical ▪ Provide a clean-looking facility following construction by cleaning-up after construction activities ▪ Keep the areas around the towers clean and free of debris	▪ No impact
Socioeconomics, Public Services, and Utilities		
▪ Potential benefit to local and regional economies through employment opportunities and purchase of goods and services ▪ Increased demand on local emergency response resources such as fire, police, and medical personnel and facilities ▪ Minor reduction on local taxing from any reduction in property values	▪ None required	▪ No impact
Transportation		
▪ Short interruptions of SR 14 traffic from construction activities ▪ Possible damage to farm roads during construction ▪ Potential for increased unauthorized access following project construction	▪ Coordinate routing and scheduling of construction traffic with state and county road staff and Burlington Northern Santa Fe Railway ▪ Employ traffic control flaggers and post signs warning of construction activity and merging traffic, when necessary for short interruptions of traffic ▪ Employ traffic control flaggers and signs warning of construction activity and merging traffic as required ▪ Repair any damages to local farm roads caused by project construction ▪ Install gates on access roads when requested by property owners to reduce unauthorized use	▪ No impact

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 6

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Air Quality		
▪ Combustion pollutants from equipment exhaust and fugitive dust particles from disturbed soils becoming airborne	▪ Water exposed soil surfaces if necessary to control blowing dust ▪ Cover construction materials if they are a source of blowing dust ▪ Limit vehicle speeds along non-graveled roads to 25 mph ▪ Shut down idling construction equipment, if feasible	▪ No impact
Noise		
▪ Residents in the vicinity of the project site could experience construction noise (associated with grading and earthmoving activities, hauling of materials, and building of towers) above Washington and Oregon noise standards ▪ Potential radio and television interference	▪ All equipment will have sound-control devices no less effective than those provided on the original equipment ▪ No equipment will have an unmuffled exhaust ▪ No noise-generating construction activity will be conducted within 1,000 feet of an occupied residence between 10:00 p.m. and 7:00 a.m. ▪ Landowners directly impacted will be notified prior to construction ▪ Bonneville will take measures to restore reception to a quality of reception as good or better than before the interference	▪ No impact
Public Health and Safety		
▪ Health and safety risks for workers, farmers, aviators, and visitors	▪ Prior to construction, the contractor would maintain a safety plan in compliance with Washington and Oregon requirements; this plan would be kept onsite and would detail how to manage hazardous materials such as fuel, and how to respond to emergency situations ▪ During construction, the contractors would also hold crew safety meetings at the start of each workday to go over potential safety issues and concerns ▪ At the end of each workday, the contractor and subcontractors will secure the site to protect equipment and the general public ▪ As necessary, employees would be trained in tower climbing, CPR, first aid, rescue techniques, and safety equipment inspection ▪ To minimize the risk of fire, all highway-authorized vehicles would be fueled offsite; equipment not highway authorized would be fueled in accordance with regulated construction practices and state and local laws; helicopters would be fueled and housed at local airfields	▪ No impact

Table 2-3: Summary of Impacts and Mitigation Measures for the Proposed Action and No Action Alternative, p 7

Proposed Action		No Action
Potential Impact	**Mitigation Measures**	**Potential Impacts**
Public Health and Safety		
	▪ Helicopter pilots and the contractor would work with communities along the corridor to ensure public safety; contractors would also work with local crop dusters and agricultural businesses to minimize interruption in agricultural activity during construction ▪ If blasting is required, a notice would be sent to residents in the affected area; a public meeting for residents and other interested parties would be held prior to blasting regarding the date and time of the blasting and to answer questions; during blasting, appropriate safety measures would be taken as required by state and local codes and regulations; all explosives would be removed from the work site at the end of the work day ▪ If implosion bolts are used to connect the conductors, they would be installed in such a way as to minimize potential health and safety risks ▪ Construction and operation/maintenance workers would need to be trained in what to do in the event of a chemical release from the Umatilla Army Depot ▪ Operation and maintenance vehicles would be required to carry fire suppression equipment including (but not limited to) shovels and fire extinguishers ▪ Drivers would be required to stay on established access roads and smoking would be prohibited ▪ The corridor would be maintained to control tall grass that could potentially start fires via contact with hot vehicle parts; trees and other tall vegetation would be trimmed to Bonneville standards to avoid contact with transmission lines ▪ Towers are not expected to exceed 200 feet in height; FAA laws would be followed regarding the placement of line markers to warn aircraft; Bonneville would submit locations and tower heights to FAA for review; requirements for markings and lighting would be addressed at that time ▪ Because of the proposed transmission line's proximity to agricultural fields, crop dusting pilots planning to enter the area would take suitable precautions to avoid collision with the proposed transmission lines	

Table 2-4: Summary of Impacts of Short-Line Alternatives, McNary-John Day Transmission Project

McNary Substation Alternatives			Hanford-John Day Junction Alternatives			Corridor Mile 32 Alternatives		Corridor Mile 35 Alternatives	
Alternative A	**Alternative B**	**Alternative C**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative A**	**Alternative B**	**Alternative A**	**Alternative B**
Wildlife viewing temporarily obstructed; no impact to soils; some sedimentation to Columbia River and pond habitat; about 0.1 acre of trees in wetland; about 2 acres grassland removed for building relocation; about 2 acres marginal grassland habitat removed; no cultural resource impacts with mitigation; recreationists and travelers would have views of construction; no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	Wildlife viewing temporarily obstructed; no impact to soils; some sedimentation to Columbia River and pond habitat, though less ground disturbance than Alternative A, but closer to river; about 0.2 acre of willows in wetland removed; cottonwood trees and vegetation removed; bird nesting and ground dwelling animal habitat removed, increased risk of avian collisions; no cultural resource impacts with mitigation; recreationists and travelers would views of construction; no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	No recreation impacts anticipated; no impact to soils; slight increased (than Alternative A or Alternative B) sedimentation to Columbia River and pond habitat though ground disturbance and permanent surface of bus work; minor sediments to wetland; about 0.7 acre of grassland removed for bus work; negligible wildlife impacts; no cultural resource impacts with mitigation; recreationists, travelers, and residence would have views of bus work; no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	About 1.5 acres of grazing land disturbed; no impact to soils; no impact to fish/water; invasive *Ailanthus* sp. trees in wetland may be removed; sedimentation to small wetland; about 1.6 acres of vegetation impacted; negligible wildlife impacts; no cultural resource impacts with mitigation; views of line from highway and residence (less than Alternative B or C); no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	About 1.5 acres of grazing land disturbed, residence may need to be removed; no impact to soils; no impact to fish/water; trees in wetland may be removed, sedimentation to small wetland; about 1acre of vegetation impacted, 10 invasive *Ailanthus* sp. trees removed; loss of trees reduce bird nesting habitat; no cultural resource impacts with mitigation; views of line from highway and residence (more than Alternative A); no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise and corona noise; no specific health and safety impacts	About 1.5 acres of grazing land disturbed, residence may need to be removed; no impact to soils; no impact to fish/water; invasive ailanthus sp. trees in wetland may be removed; sedimentation and potential fill in small wetland; about 1acre of vegetation impacted, 10 invasive ailanthus sp. trees removed; loss of trees reduce bird nesting habitat; no cultural resource impacts with mitigation; views of line from highway and residence (more than Alternative A); no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise and corona noise; no specific health and safety impacts	About 0.8 acre of cropland removed from production; no impact to soils; no impact to fish/water; no wetland impacts; about .4 acres grazed shrub-steppe impacted; minor impacts to grazed shrub-steppe designated Priority Habitat by WDFW; no cultural resource impacts with mitigation; travelers on highway and agricultural workers would view line (less than Alternative B); agreement between tribes and Bonneville needed to cross tribal; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	About 0.6 acre of cropland; no impact to soils; no impact to fish/water; no wetland impacts; about 5.5 acres grazed shrub-steppe impacted; about 1 acre of marginal agricultural habitat removed; no cultural resource impacts with mitigation; travelers on highway and agricultural workers would view line (more than Alternative A); no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	About 0.8 acre of cropland removed from production; no impact to soils; slight sedimentation to Columbia River (less than Alternative B); no wetland impacts; no vegetation impacts; minor impact to heavily grazed shrub-steppe habitat; no cultural resource impacts with mitigation; travelers on highway and agricultural workers would view line (less than Alternative B); agreement between tribes and Bonneville needed to cross tribal; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts	About 0.6 acre of cropland; no impact to soils; slight sedimentation to Columbia River (more than Alternative A); no wetland impacts; about 5.5 acres grazed shrub-steppe impacted; minor impact to heavily grazed shrub-steppe habitat (more than Alternative A); no cultural resource impacts with mitigation; travelers on highway and agricultural workers would view line (more than Alternative A); no impact to socioeconomics; negligible transportation impacts during construction; minimal air quality impacts during construction/operation; construction noise; no specific health and safety impacts